

WHAT IS CLAIMED IS:

1. A signal intercept and analysis processor for a wideband intercept receiver system including at least one wideband receiver, said intercept and analysis processor comprising:
 - a signal detector operatively connectable to said wideband receiver; and
 - a signal extractor operatively connected to said signal detector and connectable to said wideband receiver for performing signal extraction directly on a wideband signal output of said receiver and for performing said signal extraction only upon detection of at least one signal by said signal detector.
2. The signal intercept and analysis processor defined in claim 1 wherein said signal detector includes means for generating a time-frequency representation of said wideband signal output.
3. The signal intercept and analysis processor defined in claim 2 wherein said means for generating is a means for generating a coarsely sampled or decimated time-frequency representation of said wideband signal output.
4. The signal intercept and analysis processor defined in claim 3 wherein said time-frequency representation is decimated or coarsely sampled in time compared to an inverse frequency filter bandwidth used in said time-frequency representation.
5. The signal intercept and analysis processor defined in claim 2 wherein said means for generating includes a digital filter bank.
6. The signal intercept and analysis processor defined in claim 5 wherein said digital filter bank includes means for performing a sequence of windowed FFTs on samples of said wideband signal output.

7. The signal intercept and analysis processor defined in claim 6 wherein a stride between consecutive ones of said FFTs is considerably larger than a length of each of said FFTs.

8. The signal intercept and analysis processor defined in claim 1, further comprising a buffer connectable to said receiver on one side and connected to said detector and said extractor on another side.

9. A signal intercept method for a wideband intercept receiver system, said method comprising:

analyzing a wideband signal output of a wideband receiver to detect whether a signal is present in said wideband signal output; and

upon detecting the presence of at least one signal in said wideband signal output and only upon detecting the presence of at least one signal in said wideband signal output, extracting said signal directly from said wideband signal output.

10. The signal intercept method defined in claim 9 wherein the analyzing of said wideband signal output includes generating a time-frequency representation of said wideband signal output.

11. The signal intercept method defined in claim 10 wherein said time-frequency representation is coarsely sampled or decimated,

12. The signal intercept method defined in claim 11 wherein said time-frequency representation is decimated or coarsely sampled in time compared to an inverse frequency filter bandwidth used in said time-frequency representation.

13. The signal intercept and analysis method defined in claim 10 wherein the generating of said representation includes operating a digital filter bank.

14. The signal intercept method defined in claim 13 wherein the operating of said digital filter bank includes performing a sequence of windowed FFTs on samples of said wideband signal output.

15. The signal intercept method defined in claim 14 wherein a stride between consecutive ones of said FFTs is considerably larger than a length of each of said FFTs.

16. The signal intercept method defined in claim 9, further comprising temporarily storing said wideband signal output in a buffer prior to the analyzing of said wideband signal output.

17. The signal intercept method defined in claim 16 where the storing of said wideband signal continues at least until the extracting of said signal occurs, the same stored data being used in the analyzing of said wideband signal output and the extracting of said signal.

18. The signal intercept method defined in claim 9 wherein said one signal is one of a plurality of signals present in said wideband signal output, the analyzing of said wideband signal output including the detecting of all said signals in said wideband signal output, further comprising, extracting said signals directly from said wideband signal output upon detecting the presence of said signals in said wideband signal output.

19. A signal intercept and analysis processor for a wideband intercept receiver system, said intercept and analysis processor comprising:

a digital filter bank generating a coarsely sampled or decimated time-frequency representation of a wideband signal output of a wideband receiver of said wideband intercept receiver system, said time-frequency representation being coarsely sampled or decimated in a time domain and fully represented in a frequency domain; and

a signal detection component operatively connected to said digital filter bank for analyzing said time-frequency representation to detect presence of a signal.

20. The signal intercept and analysis processor defined in claim 19 wherein said digital filter bank includes means for performing a sequence of windowed FFTs on samples of said wideband signal output.

21. The signal intercept and analysis processor defined in claim 20 wherein a stride between consecutive ones of said FFTs is considerably larger than a length of each of said FFTs.

22. The signal intercept and analysis processor defined in claim 19 wherein said time-frequency representation is decimated or coarsely sampled in time compared to an inverse frequency filter bandwidth used in said time-frequency representation.

23. The signal intercept and analysis processor defined in claim 19, further comprising a buffer connectable to said receiver on one side and connected to said detector and said extractor on another side.

24. A signal intercept and analysis method comprising:

generating a coarsely sampled or decimated time-frequency representation of a wideband signal output, said time-frequency representation being coarsely sampled or decimated in a time domain and fully represented in a frequency domain; and

analyzing said time-frequency representation to detect presence of a signal.

25. The signal intercept and analysis method defined in claim 24, further comprising estimating and outputting coarse end points and a center frequency for each detected signal.

26. The signal intercept and analysis method defined in claim 25 wherein the estimating of a center frequency includes centroiding signal energy in frequency for a respective detected signal.

27. The signal intercept and analysis method defined in claim 26 wherein estimating and outputting of said center frequency includes estimating and outputting signal bandwidth.

28. The signal intercept and analysis method defined in claim 27, further comprising using said estimated center frequency as a filter center frequency to extract the detected signal directly from said wideband signal output, using said coarse end points to determine an extent of samples of said wideband signal output, and using said signal bandwidth to select a digital filter for extracting the detected signal.

29. The signal intercept and analysis method defined in claim 25, further comprising using said coarse end points to determine an extent of samples of said wideband signal output and using said estimated center frequency as a filter center frequency to extract the detected signal directly from said wideband signal output.

30. The signal intercept and analysis method defined in claim 24 wherein the generating of said time-frequency representation includes operating a coarse digital filter bank.

31. The signal intercept and analysis method defined in claim 30 wherein the operating of said coarse digital filter bank includes performing a sequence of windowed FFTs on samples of said wideband signal output.

32. The signal intercept and analysis method defined in claim 31 wherein a temporal stride between consecutive one of said FFTs is considerably larger than a length of each of said FFTs.

33. The signal intercept and analysis method defined in claim 31 wherein consecutive FFTs are separated by a temporal stride, the analyzing of said time-frequency representation being performed after each temporal stride.

34. The signal intercept and analysis method defined in claim 24, further comprising temporarily storing the wideband signal output prior to the generating of said time-frequency representation.

35. The signal intercept and analysis method defined in claim 24 wherein said time-frequency representation includes only power or magnitude as a function of time and frequency.

36. The signal intercept and analysis method defined in claim 24, further comprising extracting the detected signal directly from said wideband signal output.

37. The signal intercept and analysis method defined in claim 36, further comprising estimating a bandwidth of the detected signal, the extracting of said detected signal being at a sampling rate reduced or decimated in accordance with the estimated bandwidth.

38. The signal intercept and analysis method defined in claim 36, further comprising estimating a bandwidth and center frequency of the detected signal and using a filter corresponding to the estimated bandwidth and center frequency to extract the detected signal.

39. The signal intercept and analysis method defined in claim 24 wherein the analyzing of said time-frequency representation includes first selecting thresholds using Constant False Alarm Rate techniques and then thresholding time-frequency data.

40. The signal intercept and analysis method defined in claim 39, further comprising operating on at least one of time and frequency dimensions to generate an enhanced level of detection, the operating being taken from the group consisting of merging and pruning of the thresholded time-frequency data.